10BASE-T TWISTED PAIR
MEDIA INTERFACE MODULE
(TPMIM-22/24/32/34)

INSTALLATION GUIDE

CABLETRON
SYSTEMS INC.

The Complete Networking Solution

CABLETRON SYSTEMS, P.O. Box 5005, Rochester, NH 03867-5005

NOTICE

Cabletron Systems reserves the right to make changes in specifications and other information contained in this document without prior notice. The reader should in all cases consult Cabletron Systems to determine whether any such changes have been made.

The hardware, firmware, or software described in this manual is subject to change without notice.

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FCC NOTICE

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: This equipment uses and generates and can radiate radio frequency energy and if not installed properly and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A digital device pursuant to Subpart J, of Part 15, of FCC Rules, which are designed to provide reasonable protection against such interference in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever steps may be necessary to correct the interference.

If this equipment does cause interference to radio or television, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Re-orient the receiving antenna.
• Relocate the MMAC with respect to the receiving antenna.
• Move the MMAC away from the receiver.
• Plug the MMAC into a a different outlet so that the MMAC and   the receiver

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communication Commission helpful:

"How to Identify and Resolve Radio TV Interference Problems"

This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402 - Stock No. 004-000-00345-4.

CONTENTS

CHAPTER 1

INTRODUCTION

Welcome to the Cabletron Systems **10BASE-T Twisted Pair Media Interface Module (TPMIM™) Installation Guide**. We have designed this manual to serve as a simple reference guide for the TPMIM. Before using the TPMIM, you need to carefully read through this manual to gain a full understanding of the TPMIM and its capabilities.

Cabletron Systems offers four versions of the 10BASE-T Twisted Pair Media Interface Module (Fig. 1-1) for connecting 10BASE-T Twisted Pair Segments to a Multi Media Access Center (MMAC™):

• TPMIM-22 with 12 RJ-45 ports.

• TPMIM-24 with 24 RJ-45 ports.

• TPMIM-32 with one 50 pin Champ connector.

• TPMIM-34 with two 50 pin Champ connectors.

1.1 USING THIS MANUAL

Chapter 1, **Introduction**, discusses the capabilities and special features of Cabletron Systems' TPMIM. This chapter also includes a list of related manuals.

Chapter 2, **Installation Requirements/Specifications**, contains a list of network requirements that must be met before installing the TPMIM. The specifications for the TPMIM are also included in this section.

Chapter 3, **Installing the TPMIM**, contains instructions for installing the TPMIM into the MMAC, connecting twisted pair segments to the MIM, and connecting 10BASE-T Ethernet devices to the TPMIM.
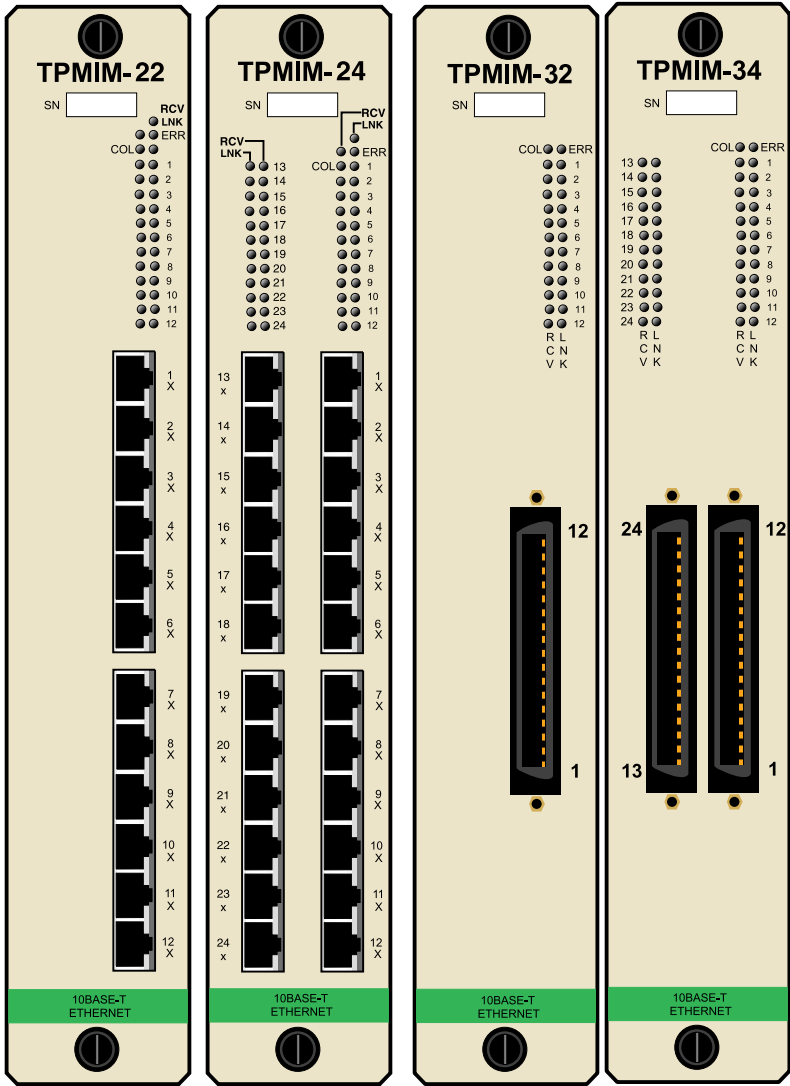
Figure 1-1. 10BASE-T Twisted Pair Media Interface Modules

Chapter 4, **Testing and Troubleshooting**, provides procedures for testing and troubleshooting the installation of the TPMIM. Instructions for using LAN-VIEW®, Cabletron Systems' built-in visual diagnostic and status monitoring system, are also included.

We assume that you have a general working knowledge of Ethernet or IEEE 802.3 type data communications networks and their physical layer components.

1.2 GETTING HELP

If you need additional support related to the Cabletron Systems TPMIM, or if you have any questions, comments or suggestions related to this manual, feel free to contact Cabletron Systems' Technical Support at:

Cabletron Systems
35 Industrial Way
P.O. Box 5005
Rochester, NH 03867-5005
Phone: (603) 332-9400

1.3 THE 10BASE-T TWISTED PAIR MEDIA INTERFACE MODULES

Cabletron Systems' 10BASE-T Twisted Pair Media Interface Modules provide 12 or 24 ports, utilizing either RJ-45 ports or 50-pin Champ connectors. When used with the MMAC-8/FNB™, up to 168 10BASE-T twisted pair segments can be connected.

Distance and Cable Type
The TPMIM supports 10BASE-T Twisted Pair Segments up to 125 meters in length. These segments can be made from a wide variety of popular unshielded twisted pair cabling with properties varying from 75-165 ohm impedance and 22-26 AWG conductor size.

Polarity Detection and Correction
Each Port on the TPMIM incorporates a Polarity Detection and Correction fea-
ture. The Polarity Detection and Correction feature allows the TPMIM to pass
data regardless of the polarity of the twisted pair segments' receive link. If polar-
ity is reversed, the LNK LED will flash to indicate this condition, once a good
packet passes through the port.

*NOTE: If this condition exists, the segment should be removed from the TPMIM
and the wiring corrected in the event that, in the future, the segment needs to be
attached to a device without the Polarity Correction and Detection feature.*

Multi Media Access Centers
The Cabletron Systems' 10BASE-T Twisted Pair Media Interface Modules are
designed to be installed into the Cabletron Systems MMAC. The modular design
of the MMAC allows the TPMIM to
co-exist with other Media Interface Modules (MIM™s) to provide a variety of dif-
ferent media connections on any one point. This means that the TPMIM can be
used by itself or in conjunction with any combination of other MIMs accommo-
dating Fiber Optic Cable, Thick or Thin Ethernet Coaxial Cabling, or AUI Ca-
bling.

Each packet entering the TPMIM is repeated by the MMAC's repeater module.
These include the Cabletron Systems Intelligent Repeater Module (IRM-2™) and
Intelligent Repeater Bridging Module (IRBM™). Each packet that enters the re-
peater module is regenerated and retimed, which assures data integrity and maxi-
mum data path distance. In addition, the repeater feature ensures fault isolation,
since the repeater module will automatically segment problem ports from the net-
work. A segmented port will be automatically reconnected to the network once
the port has received a good packet.

The repeater module also allows you to access the network management capabilities that enable you to control the TPMIM and its attached segments. For example, information on the number of good packets and collisions that have passed through the TPMIM and each port on the MIM can be gathered. A variety of network management programs can be used to manage the TPMIM, including:

• Cabletron Systems SPECTRUM™.
• Cabletron Systems Remote LANVIEW/Windows™.
• Cabletron Systems Local Management.
• Third party SNMP compliant network management packages.

LANVIEW LEDs
The TPMIM incorporates LANVIEW, Cabletron Systems' built-in diagnostic and status monitoring LED system. These LEDs, incorporated into all Cabletron Systems' products, will assist you in rapidly diagnosing network problems as they arise. Each port on the TPMIM has two LANVIEW LEDs: the Link OK (LNK) LED and the Receive (RCV) LED. The Link OK LED will remain lit as long as a link is maintained between the applicable port on the module and the 10BASE-T device at the other end of the cable. If a link is not established, the LED will not be lit. The Receive LED will be lit when activity is detected on the segment.

The TPMIM also has one Collision (CLN) LED, which indicates a collision on any segment attached to one of the ports, and one Error (ERR) LED, which indicates a potential temperature problem within the MMAC.

1.3.1The TPMIM-22/24

The TPMIM-22/24 design incorporates built-in RJ-45 ports, 12 on the TPMIM-22 and 24 on the TPMIM-24. This design makes it easier to incorporate twisted pair wiring schemes into your network. The TPMIM-22/24 allows you to directly connect the segments to patch panels or other 10BASE-T Ethernet devices, eliminating the need for Punch-Down blocks or additional patch panels.

Each RJ-45 port on the TPMIM-22/24 is internally crossed over, eliminating the need to cross over the twisted pair segment going from the port to the 10BASE-T device at the other end of the segment.

1.3.2 The TPMIM-32/34

The TPMIM-32/34 provides an alternative method for incorporating 10BASE-T twisted pair segments into an existing twisted pair wiring scheme. The TPMIM-32 has one 50 pin Champ connector that allows you to connect 12 segments to the module. The
TPMIM-34 has two 50 pin Champ connector that allows you to connect 24 segments to the module. The 50 Pin Champ connector allows the MIM to tie directly into Punch-Down blocks and patch panels. This connector complies with all punch down and harmonica specifications.

1.4 RELATED MANUALS

The manuals listed below should be used to supplement the procedures and other technical data provided in this manual. The procedures in them will be referenced, where appropriate, but will not be repeated.

Cabletron Systems' **Multi-Media Access Center (MMAC-3/FNB MMAC-5FNB and MMAC-8/FNB)** Overview and Set Up Guide.

Cabletron Systems **LAN-MD** User Manual.

CHAPTER 2

INSTALLATION REQUIREMENTS/SPECIFICATIONS

Before you attempt to install the Cabletron Systems 10BASE-T Twisted Pair Media Interface Modules, review the network requirements that are outlined in this chapter. Also, refer to the operating specifications that are listed.

All conditions, guidelines, specifications, and requirements included in this chapter must be met to ensure satisfactory performance of the TPMIM. Failure to follow these guidelines may result in unsatisfactory network performance.

2.1   NETWORK REQUIREMENTS

When connecting 10BASE-T twisted pair segments to the TPMIM, you must follow the network guidelines listed below.

- **Length** - The IEEE 802.3 10BASE-T standard requires that 10BASE-T transceivers be able to transmit over a 100 meter (328 feet) link using 24 AWG unshielded twisted pair wire. 10BASE-T specifies no maximum link length.

  Due to cable delay, the maximum link length is always limited to about 200 meters (656 feet), regardless of the cable type.

  As a general rule, links of up to 150 meters (492 feet) long are achievable for unshielded and shielded twisted pair cable, with a maximum of 200 meters (656 feet) due to cable delay. For each connector or patch panel in the link, subtract 12 meters (39.4 feet) from the 150 meter limit. This will allow for links of up to 126 meters (413.4 feet) using standard 24 AWG UTP wire and two patch panels within the link. Higher quality low attenuation cables may be required when using links greater than 126 meters.

- **Insertion Loss** - The maximum insertion loss allowed for a 10BASE-T link is 11.5 dB at all frequencies between 5.0 and 10.0 MHz. This includes the attenuation of the cables, connectors, patch panels, and reflection losses due to impedance mismatches in the link segment.

- **Impedance** - Unshielded twisted pair cables typically have an impedance of between 85 to 110 ohms. Shielded cables, such as Type 1 cable, can also be used. You should remember that the impedance of Type 1 cable is typically 150 ohms, as this increases the signal reflection caused by the cable. Since the cable is shielded, signal reflection has little effect on the received signal's quality due to the lack of crosstalk between the shielded cable pairs. Cabletron Systems' 10BASE-T twisted pair products will work on shielded twisted pair cable with 75 to 165 ohms impedance.

- **Jitter** - Intersymbol interference and reflections can cause jitter in the bit cell timing, resulting in data errors. A 10BASE-T link must not generate more than 5.0 nsec of jitter. If your cable meets the impedance requirements for a 10BASE-T link, jitter should not be a concern.

- **Delay** - The maximum propagation delay of a 10BASE-T link segment must not exceed 1000 nsec. This 1000 nsec maximum delay limits the maximum link segment length to no greater than 200 meters.

- **Crosstalk** - Crosstalk is caused by signal coupling between the different cable pairs contained within a multi-pair cable bundle. 10BASE-T transceivers are designed so that the user does not need to be concerned about cable crosstalk, provided the cable meets all other requirements.

- **Noise** - Noise can be caused by either crosstalk or externally induced impulses. Impulse noise may cause data errors if the impulses occur at very specific times during data transmission. Generally, the user does not need to be concerned about noise. If noise related data errors are suspected, it may be necessary to either reroute the cable or eliminate the source of the impulse noise.

- **Temperature** - Multi-pair, PVC 24 AWG telephone cables have an attenuation of approximately 8 to 10 dB/100 m at 20° C. The attenuation of PVC insulated cable varies significantly with temperature. At temperatures greater than 40° C, we strongly recommend that you use plenum rated cables to ensure that cable attenuation remains within specification.

2.2   OPERATING SPECIFICATIONS

The operating specifications for the Cabletron Systems TPMIM are included in this section. Cabletron Systems reserves the right to change these specifications at any time without notice.

RJ-45 INTERFACE (TPMIM-22/24)

Internal Transceiver:Cabletron Systems' TPT 10BASE-T Twisted Pair Transceiver.

Type:Internally Crossed Over RJ-45 Jack

Pin	1	RX+	Pin	5	No Connection
	2	RX-		6	TX-
	3	TX+		7	No Connection
	4	No Connection		8	No Connection

CHAMP CONNECTOR INTERFACE (TPMIM-32/34)

Type: 50 Pin Champ Connector

Pin	Signal	Wire Color	Pin	Signal	Wire Color
1	RX 1-	Blue/White	26	RX 1+	White/Blue
2	TX 1-	Orange/White	27	TX 1+	White/Orange
3	RX 2-	Green/White	28	RX 2+	White/Green
4	TX 2-	Brown/White	29	TX 2+	White/Brown
5	RX 3-	Gray/White	30	RX 3+	White/Gray
6	TX 3-	Blue/Red	31	TX 3+	Red/Blue
7	RX 4-	Orange/Red	32	RX 4+	Red/Orange
8	TX 4-	Green/Red	33	TX 4+	Red/Green
9	RX 5-	Brown/Red	34	RX 5+	Red/Brown
10	TX 5-	Gray/Red	35	TX 5+	Red/Gray
11	RX 6-	Blue/Black	36	RX 6+	Black/Blue
12	TX 6-	Orange/Black	37	TX 6+	Black/Orange
13	RX 7-	Green/Black	38	RX 7+	Black/Green
14	TX 7-	Brown/Black	39	TX 7+	Black/Brown
15	RX 8-	Gray/Black	40	RX 8+	Black/Gray
16	TX 8-	Blue/Yellow	41	TX 8+	Yellow/Blue
17	RX 9-	Orange/Yellow	42	RX 9+	Yellow/Orange
18	TX 9-	Green/Yellow	43	TX 9+	Yellow/Green
19	RX 10-	Brown/Yellow	44	RX 10+	Yellow/Brown
20	TX 10-	Gray/Yellow	45	TX 10+	Yellow/Gray
21	RX 11-	Blue/Violet	46	RX 11+	Violet/Blue
22	TX 11-	Orange/Violet	47	TX 11+	Violet/Orange
23	RX 12-	Green/Violet	48	RX 12+	Violet/Green
24	TX 12-	Brown/Violet	49	TX 12+	Violet/Brown
25	N/C	Gray/Violet	50	N/C	Violet/Gray

FRONT PANEL INDICATORS

CLN   When flashing, this red indicator
(Collision Present)   indicates that a collision has occurred on one
of the segments   attached to the module.

ERR (Error)   When lit, this red indicator indicates that a
                      potential temperature problem exists inside
                      the MMAC.

NOTE: There is one Link and Receive LED for each port on the module.

LNK (Link)   When lit, this green LED indicates that a link
                      has been established between that TPMIM
                      port and the 10BASE-T compliant device at
                      the other end of the twisted pair segment.

RCV (Receive)   When flashing or lit , this yellow LED indi-
                      cates that the TPMIM is receiving a data
                      packet from the segment connected to the
                      port.

ENVIRONMENTAL REQUIREMENTS

Operating temperature:+5° to +40° C (41° to 104° F)

Non operating temperature:-30° to +80° C (-22° to 160° F)

Operating humidity:5 to 95% (non-condensing)

SAFETY

WARNING: *It is the responsibility of the person who sells the system to which the TPMIM will be a part to ensure that the total system meets allowed limits of conducted and radiated emissions.*

Designed in accordance with UL478, UL910, NEC 725-2(b), CSA, IEC, TUV, VDE Class A. Meets FCC part 15, Class A limits.

SERVICE

MTBF (MHBK-217E)

TPMIM-22	>192,159 hrs.
TPMIM-24	>107,736 hrs.
TPMIM-32	>195,350 hrs.
TPMIM-34	>108,062 hrs.

MTTR<0.5 hr.

PHYSICAL

Dimensions	34.04 D x 29.21 H x 5.08 W cm (13.4 D x 11.5 H x 2.0 W in)
Weight	
TPMIM-22/32	.658 kg (1.45 lbs)
TPMIM-24/34	1.09 kg (2.4 lbs)

CHAPTER 3

INSTALLING THE TPMIM

This chapter contains instructions for installing the Cabletron Systems 10BASE-T Twisted Pair Media Interface Module (TPMIM) into any of Cabletron Systems' MMACs. Instructions for connecting twisted pair segments to the MIM are also included. Check that all requirements listed in Chapter 2, **Installation Requirements/Specifications**, are met before installing the MIM.

3.1 UNPACKING THE TPMIM

Before you install the TPMIM, you should visually inspect it.

To unpack the TPMIM:

1.   Remove the shipping material covering the module in the shipping box.

2.   Carefully remove the module from the shipping box. Leave the module in its conductive bag until you are ready to install it. Save the shipping box and materials in the event the unit has to be reshipped.

3.   Visually inspect the module. If any damage appears to have occurred, contact Cabletron Systems' Technical Support immediately.

3.2 INSTALLING THE TPMIM INTO THE MMAC

The TPMIM is designed to be easily installed into any MMAC. When you install the TPMIM, the following guidelines must be followed:

•   You cannot install the TPMIM into Slot 1, which is reserved for theRepeater Module.

• If installing a TPMIM-24/34, an IRM-2 or an IRBM must be installed Slot 1.

• If the module is going to be installed into an MMAC-8™/MMAC-8FNB™/MMAC-5FNB™, be sure a Power Supply Module (PSM-R™, or MMAC-5PSM™) is installed in the MMAC to supply power to the module. The MMAC-3™/MMAC-3FNB™ have a built-in power supply.

Install the TPMIM into the MMAC as follows:

1.   Slide the TPMIM (2, Fig. 3-1) into the MMAC's (1) card cage. Be sure that the card is in the top and bottom slots (4) of the case.
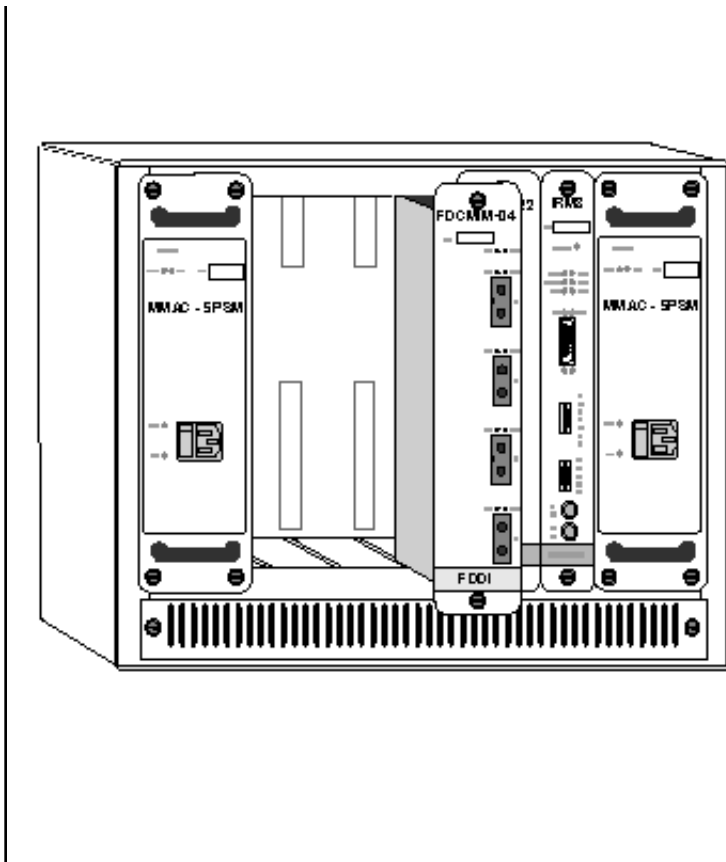
Figure 3-1. Installing a Module in the MMAC

2.   Secure the module to the MMAC by turning the knurled knobs (3). Be sure the TPMIM is firmly attached to the MMAC by turning the knurled knobs. Failure to do so may result in improper operation.

3.3 CONNECTING THE TPMIM TO THE NETWORK

The following provides instructions for connecting twisted pair segments to the TPMIM. The procedure varies depending on which TPMIM is installed in your MMAC.

3.3.1 Attaching Twisted Pair Segments to the TPMIM-22/24

The TPMIM-22 has 12 RJ-45 ports, while the TPMIM-24 has 24 RJ-45 ports. This provides easy connection of unshielded twisted pair segments to the MIM.

Each port on the module is internally crossed over. This is indicated by an **X** next to the port.

To connect a twisted pair segment to the TPMIM-22/24:

1.   Insert the RJ-45 connector on the twisted pair segment into an RJ-45 port on the TPMIM.

2.   At the device end of a segment, attach the segment to a 10BASE-T complaint device.

3.   Check that the Link light on the 10BASE-T Ethernet device and the LNK LED on the TPMIM are lit. If the LEDs are not lit, perform each of the following steps until the LEDs are lit:

   a.   Check that the 10BASE-T device and the MMAC are powered up.

   b.   Disconnect the RJ-45 connector from the RJ-45 port on the 10BASE-T device.

   c.   Verify that the RJ-45 connector on the twisted pair segment has the proper pin outs. See Figure 3-2.

   d.   Check the cable for continuity.

If a link has not been established, contact Cabletron Systems' Technical Support.

If the Link LED is flashing, once a good packet passes through the port, this indicates that the polarity of the twisted pair segments' receive link is reversed. If this condition exists, the segment should be removed from the TPMIM and the wiring corrected in the event that, in the future, the segment needs to be attached to a device without the Polarity Correction and Detection feature.

TPMIM-22/24 RJ-45 Port	Twisted Pair Segment	10BASE-T Device End RJ-45 Port
Pin 1 - RX+	←→	Pin 1 - TX+
Pin 2 - RX-	←→	Pin 2 - TX-
Pin 3 - TX+	←→	Pin 3 - RX+
Pin 4 - N/C		Pin 4 - N/C
Pin 5 - N/C		Pin 5 - N/C
Pin 6 - TX-	←→	Pin 6 - RX-
Pin 7 - N/C		Pin 7 - N/C
Pin 8 - N/C		Pin 8 - N/C

Figure 3-2. Cable Pinouts - TPMIM-22/24

3.3.2 Attaching Twisted Pair Segments to the TPMIM-32/34

The TPMIM-32 has a 50 pin Champ connector, while the TPMIM-34 has two 50-pin Champ connectors. This configuration of the TPMIM allows you to run a 50 pin feeder cable from the TPMIM to a punch down block. Each Champ connector can accommodate 12 10BASE-T, twisted pair segments.

As an aid, three tables and one figure have been included with this section. Table 3-1 describes the pins and the color codes that are used in twisted wiring from the TPMIM-32/34 and a punch down block. Table 3-2 describes the pins and the color codes that are used from a punch down block to a 10BASE-T Ethernet device. Table 3-3 gives a summary of twisted pair wiring between a TPMIM-32/34 and a 10BASE-T Ethernet device. Figure 3-3 illustrates a labeled punch down block.

To connect the TPMIM-32/34 into an existing twisted pair wiring system:

1.   Connect a 50-pin feeder cable to the Champ connector on the TPMIM.

2.   Attach the feeder cable to the punch down block, or patch panel. If using a TPMIM-34, a second 50-pin feeder cable can be connected to the MIM.

     In most cases, the feeder cable can be connected directly to a punch down block by a Champ connector located on the block. If not, the punch down block must be wired using the punch down information in Table 3-1 and Figure 3-2. This table and figure describe the pins and the color codes that are used to wire into a punch down block.

3.   At the device end of a segment, attach the segment to a 10BASE-T complaint Ethernet device.

4.   Check that the Link light on the 10BASE-T Ethernet device and the LNK LED on the TPMIM are lit. If the LEDs are not lit, perform each of the following steps until the LEDs are lit:

     a.   Check that the 10BASE-T device and the MMAC are powered up.

     b.   Verify the cabling between the module and the 10BASE-T device.

     c.   Check the cable for continuity.

If a link has not been established, contact Cabletron Systems' Technical Support.

If the Link LED is flashing, once a good packet passes through the port, this indicates that the polarity of the twisted pair segments' receive link is reversed. If this condition exists, the segment should be removed from the TPMIM and the wiring corrected in the event that, in the future, the segment needs to be attached to a device without the Polarity Correction and Detection feature.
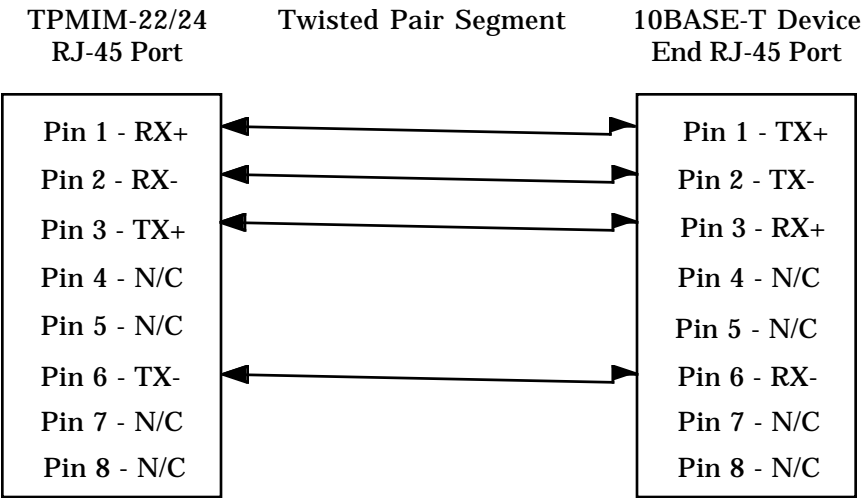
TABLE 3-1

TWISTED PAIRS WIRING
FROM A TPMIM-32/34 TO A PUNCH DOWN BLOCK

From		Into and Out of		50 Into Punchdown		
TPMIM-32/34	Pin	Feeder Cable		Block		

Port 12/24	Pin		Pin				
RX+	Pin 48	48	Violet/Green	RX+	A45	Violet/Green	RX+
RX-	Pin 23	23	Green/Violet	RX-	A46	Green/Violet	RX-
TX+	Pin 49	49	Violet/Brown	TX+	A47	Violet/Brown	TX+
TX-	Pin 24	24	Brown/Violet	TX-	A48	Brown/Violet	TX-

Port 11/23	Pin		Pin				
RX+	Pin 46	46	Violet/Blue	RX+	A41	Violet/Blue	RX+
RX-	Pin 21	21	Blue/Violet	RX-	A42	Blue/Violet	RX-
TX+	Pin 47	47	Violet/Orange	TX+	A43	Violet/Orange	TX+
TX-	Pin 22	22	Orange/Violet	TX-	A44	Orange/Violet	TX-

Port 10/22	Pin		Pin				
RX+	Pin 44	44	Yellow/Brown	RX+	A37	Yellow/Brown	RX+
RX-	Pin 19	19	Brown/Yellow	RX-	A38	Brown/Yellow	RX-
TX+	Pin 45	45	Yellow/Gray	TX+	A39	Yellow/Gray	TX+
TX-	Pin 20	20	Gray/Yellow	TX-	A40	Gray/Yellow	TX-

Port 9/21   Pin   Pin

RX+	Pin 42	42	Yellow/Orange	RX+	A33	Yellow/Orange	RX+
RX-	Pin 17	17	Orange/Yellow	RX-	A34	Orange/Yellow	RX-
TX+	Pin 43	43	Yellow/Green	TX+	A35	Yellow/GreenTX+	
TX-	Pin 18	18	Green/Yellow	TX-	A36	Green/Yellow	TX-

TABLE 3-1 (cont.)

TWISTED PAIRS WIRING
FROM A TPMIM-32/34 TO A PUNCH DOWN BLOCK

From	Into and Out of		50 Into Punchdown

TPMIM-32/34Pin Feeder CableBlock

Port 8/20	Pin		Pin		
RX+	Pin 40	40	Black/Gray	RX+	A29 Black/GrayRX+
RX-	Pin 15	15	Gray/Black	RX-	A30 Gray/BlackRX-
TX+	Pin 41	41	Yellow/Blue	TX+	A31 Yellow/BlueTX+
TX-	Pin 16	16	Blue/Yellow	TX-	A32 Blue/YellowTX-
Port 7/19	**Pin**		**Pin**		
RX+	Pin 38	38	Black/Green	RX+	A25 Black/GreenRX+
RX-	Pin 13	13	Green/Black	RX-	A26 Green/BlackRX-
TX+	Pin 39	39	Black/Brown	TX+	A27 Black/BrownTX+
TX-	Pin 14	14	Brown/Black	TX-	A28 Brown/BlackTX-
Port 6/18	**Pin**			**Pin**	
RX+	Pin 36	36	Black/Blue	RX+	A21 Black/BlueRX+
RX-	Pin 11	11	Blue/Black	RX-	A22 Blue/BlackRX-
TX+	Pin 37	37	Black/Orange	TX+	A23 Black/OrangeTX+
TX-	Pin 12	12	Orange/Black	TX-	A24 Orange/BlackTX-
Port 5/17	**Pin**	**Pin**			
RX+	Pin 34	34	Red/Brown	RX+	A17 Red/BrownRX+
RX-	Pin 9	9	Brown/Red	RX-	A18 Brown/RedRX-
TX+	Pin 35	35	Red/Gray	TX+	A19 Red/GrayTX+
TX-	Pin 10	10	Gray/Red	TX-	A20 Gray/RedTX-

Port 4/16	Pin			Pin	
RX+	Pin 32	32	Red/Orange	RX+	A13 Red/OrangeRX+
RX-	Pin 7	7	Orange/Red	RX-	A14 Orange/RedRX-
TX+	Pin 33	33	Red/Green	TX+	A15 Red/GreenTX+
TX-	Pin 8	8	Green/Red	TX-	A16 Green/RedTX

TABLE 3-1 (cont.)

**TWISTED PAIRS WIRING
FROM A TPMIM-32/34 TO A PUNCH DOWN BLOCK**

From	Into and Out of	50 Into Punchdown

TPMIM-32/34Pin Feeder CableBlock

Port 3/15Pin   Pin

RX+	Pin 30	30	White/Gray	RX+	A9	White/Gray	RX+
RX-	Pin 5	5	Gray/White	RX-	A10	Gray/White	RX-
TX+	Pin 31	31	Red/Blue	TX+	A11	Red/Blue	TX+
TX- Pin 6	6		Blue/RedTX-		A12	Blue/RedTX-	

Port 2/14Pin   Pin

RX+	Pin 28	28	White/Green	RX+	A5	White/Green	RX+
RX-	Pin 3	3	Green/White	RX-	A6	Green/White	RX-
TX+	Pin 29	29	White/Brown	TX+	A7	White/Brown	TX+
TX-	Pin 4	4	Brown/White	TX-	A8	Brown/White	TX-

Port 1/13Pin   Pin

RX+	Pin 26	26	White/Blue	RX+	A1	White/Blue	RX+
RX-	Pin 1	1	Blue/White	RX-	A2	Blue/White	RX-
TX+	Pin 27	27	White/Orange	TX+	A3	White/Orange	TX+
TX-	Pin 2	2	Orange/White	TX-	A4	Orange/White	TX-

NOTE: Pins 25 and 50 on champ connector are not used.

TABLE 3-2

TWISTED PAIRS WIRING
FROM A PUNCH DOWN BLOCK TO A 10BASE-T DEVICE

From Punchdown Block	Wallplate		To RJ-45 Drop		Into Office 10BASE-T			Into Device
Port 12/24		Pin	Pin		Pin			
B45	Violet/Green	RX+	1	TX+	1	TX+	1	TX+
B46	Green/Violet	RX-	2	TX-	2	TX-	2	TX-
B47	Violet/Brown	TX+	3	RX+	3	RX+	3	RX+
B48	Brown/Violet	TX-	6	RX-	6	RX-	6	RX-
Port 11/23			Pin	Pin	Pin			
B41	Violet/Blue	RX+	1	TX+	1	TX+	1	TX+
B42	Blue/Violet	RX-	2	TX-	2	TX-	2	TX-
B43	Violet/Orange	TX+	3	RX+	3	RX+	3	RX+
B44	Orange/Violet	TX-	6	RX-	6	RX-	6	RX-
Port 10/22	Pin		Pin		Pin			
B37	Yellow/Brown	RX+	1	TX+	1	TX+	1	TX+
B38	Brown/Yellow	RX-	2	TX-	2	TX-	2	TX-
B39	Yellow/Gray	TX+	3	RX+	3	RX+	3	RX+
B40	Gray/Yellow	TX-	6	RX-	6	RX-	6	RX-
Port 9/21			Pin	Pin	Pin			
B33	Yellow/Orange	RX+	1	TX+	1	TX+	1	TX+
B34	Orange/Yellow	RX-	2	TX-	2	TX-	2	TX-
B35	Yellow/Green	TX+	3	RX+	3	RX+	3	RX+
B36	Green/Yellow	TX-	6	RX-	6	RX-	6	RX-
Port 8/20			Pin	Pin	Pin			
B29	Black/Gray	RX+	1	TX+	1	TX+	1	TX+
B30	Gray/Black	RX-	2	TX-	2	TX-	2	TX-
B31	Yellow/Blue	TX+	3	RX+	3	RX+	3	RX+
B32	Blue/Yellow	TX-	6	RX-	6	RX-	6	RX-

TABLE 3-2 (cont.)

**TWISTED PAIRS WIRING
FROM A PUNCH DOWN BLOCK TO A 10BASE-T DEVICE**

From Punchdown	To RJ-45		Into Office		Into			
Block	Wallplate		Drop		10BASE-T			Device
Port 7/19		Pin		Pin		Pin		
B25	Black/Green	RX+	1	TX+	1	TX+	1	TX+
B26	Green/Black	RX-	2	TX-	2	TX-	2	TX-
B27	Black/Brown	TX+	3	RX+	3	RX+	3	RX+
B28	Brown/Black	TX-	6	RX-	6	RX-	6	RX-
Port 6/18		Pin		Pin		Pin		
B21	Black/Blue	RX+	1	TX+	1	TX+	1	TX+
B22	Blue/Black	RX-	2	TX-	2	TX-	2	TX-
B23	Black/Orange	TX+	3	RX+	3	RX+	3	RX+
B24	Orange/Black	TX-	6	RX-	6	RX-	6	RX-
Port 5/17		Pin		Pin		Pin		
B17	Red/Brown	RX+	1	TX+	1	TX+	1	TX+
B18	Brown/Red	RX-	2	TX-	2	TX-	2	TX-
B19	Red/Gray	TX+	3	RX+	3	RX+	3	RX+
B20	Gray/Red	TX-	6	RX-	6	RX-	6	RX-
Port 4/16		Pin		Pin		Pin		
B13	Red/Orange	RX+	1	TX+	1	TX+	1	TX+
B14	Orange/Red	RX-	2	TX-	2	TX-	2	TX-
B15	Red/Green	TX+	3	RX+	3	RX+	2	TX-
B16	Green/Red	TX-	6	RX-	6	RX-	6	RX-

TABLE 3-2 (cont.)

**TWISTED PAIRS WIRING
FROM A PUNCH DOWN BLOCK TO A 10BASE-T DEVICE**

From PunchdownTo RJ-45Into Office   Into

BlockWallplate			Drop		10BASE-T			Device
Port 3/15		Pin	Pin		Pin			
B9	White/Gray	RX+	1	TX+	1	TX+	1	TX+
B10	Gray/White	RX-	2	TX-	2	TX-	2	TX-
B11	Red/Blue	TX+	3	RX+	3	RX+	3	RX+
B12	Blue/Red	TX-	6	RX-	6	RX-	6	RX-
Port 2/14		Pin	Pin	Pin				
B5	White/Green	RX+	1	TX+	1	TX+	1	TX+
B6	Green/White	RX-	2	TX-	2	TX-	2	TX-
B7	White/Brown	TX+	3	RX+	3	RX+	3	RX+
B8	Brown/White	TX-	6	RX-	6	RX-	6	RX-
Port 1/13		Pin	Pin	Pin				
B1	White/Blue	RX+	1	TX+	1	TX+	1	TX+
B2	Blue/White	RX-	2	TX-	2	TX-	2	TX-
B3	White/Orange	TX+	3	RX+	3	RX+	3	RX+
B4	Orange/White	TX-	6	RX-	6	RX-	6	RX-

TABLE 3-3

TWISTED PAIR WIRING SUMMARY

TPMIM 32/34	Punch Down	Wall Plate	10BASE-T
ChampBlock	(If Required)	Ethernet
		Device

Port 12

48 RX+		A45 RX+		PIN 1 TX+		PIN 1 TX+
23 RX-	{ 25 Pin Feeder Cable }	A46 RX-	{ 4 Pair Twisted Distribution Cable }	PIN 2 TX-	{ Office Drop }	PIN 2 TX-
49 TX+		A47 TX+		PIN 3 RX+		PIN 3 RX+
24 TX-		A48 TX-		PIN 6 RX+		PIN 6 RX+

Port 11

46 RX+		A41 RX+		PIN 1 TX+		PIN 1 TX+
21 RX-	{ 25 Pin Feeder Cable }	A42 RX-	{ 4 Pair Twisted Distribution Cable }	PIN 2 TX-	{ Office Drop }	PIN 2 TX-
47 TX+		A43 TX+		PIN 3 RX+		PIN 3 RX+
22 TX-		A44 TX-		PIN 6 RX-		PIN 6 RX-

⋮   ⋮   ⋮   ⋮

Port 1

| 26 RX+ | | A1 RX+ | | PIN 1 TX+ | | PIN 1 TX+ |
1 RX-	{ 25 Pin Feeder Cable }	A2 RX-	{ 4 Pair Twisted Distribution Cable }	PIN 2 TX-	{ Office Drop }	PIN 2 TX-
27 TX+		A3 TX+		PIN 3 RX+		PIN 3 RX+
2 TX-		A4 TX-		PIN 6 RX-		PIN 6 RX-
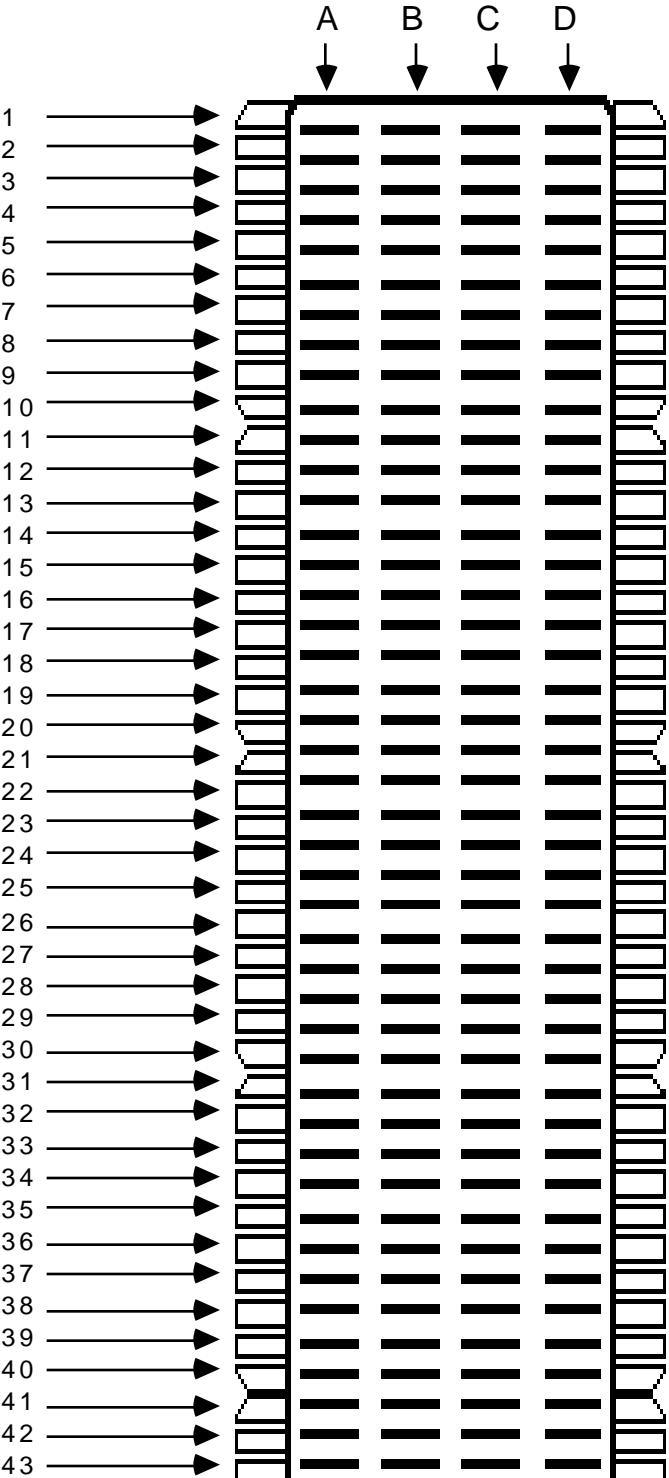
CHAPTER 4

TESTING AND LANVIEW

This section contains procedures to ensure that the connection between the TP-MIM and the 10BASE-T Ethernet device is functioning properly. A description of LANVIEW and its function in troubleshooting physical layer network problems is also provided.

4.1   INSTALLATION CHECK-OUT

You should test the TPMIM after installation to ensure that the physical layer of the network is operating properly. Two Ethernet node testers that generate valid data packets, such as Cabletron Systems' LAN-MD, are required for this procedure. Figure 4-1 illustrates a sample installation check-out configuration.

1.   Connect a 10BASE-T twisted pair transceiver, such as a Cabletron Systems TPT (3, Fig. 4-1), to the device end of the twisted pair segment connected to applicable port on the TPMIM in an MMAC (5).

2.   Connect an AUI cable (2) to the TPT.

3.   Connect a LAN-MD (1) to the AUI cable connected to the TPT.

4.   Select and run test **6 - SERVER**.

5.   Verify that the the Test Status **PASS** LED is lit and that the Status Code reads **000** or **001**. If these two conditions are met, the LAN-MD is now the **SERVER** unit and will act as a packet echoer when used with another LAN-MD.
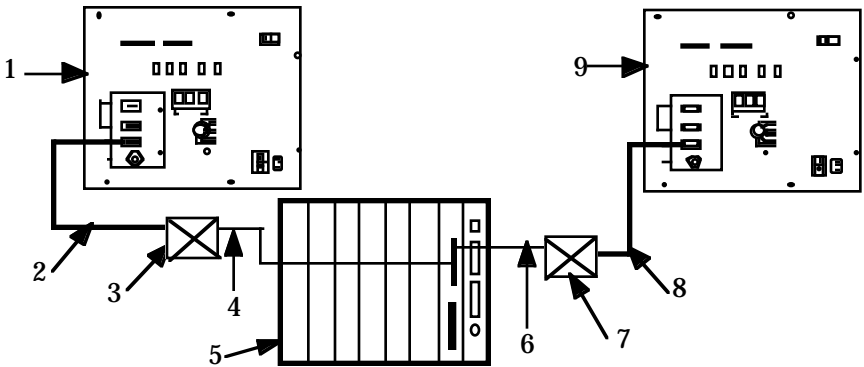
1.	LAN-MD	6.	Twisted Pair Segment
2.	AUI Cable	7.	TPT
3.	TPT	8.	AUI Cable
4.	Twisted Pair Segment	9.	LAN-MD
5.	MMAC-8		

Figure 4-1. Sample Installation Check-Out Configuration

6. Using another transceiver (7) and AUI cable (8), connect another LAN-MD (9) to any other tested segment that is connected to an MMAC.

7. Select and run test **4 - NODE** on the LAN-MD connected in step 6.

8. Verify that this test passes. At least 100 packets should be sent and received with no errors. The packets will be received from and sent back to the LAN-MD acting as the **NODE**.

When these tests have been successfully completed for each connection to the TP-MIM, the MIM is ready for normal operation. If you note any failures, please contact Cabletron Systems' Technical Support.

4.2   USING LANVIEW

The TPMIM uses Cabletron Systems built-in visual diagnostic and status moni-
toring system, LANVIEW. Using LANVIEW LEDs, your network troubleshoot-
ing personnel can quickly scan the LEDs to observe network status or diagnose
network problems, and determine which node or segment is faulty.

The following section discusses the function and the purpose of each LANVIEW
LED on the TPMIM. You should note that there is one Link OK (**LNK**) and one
Receive (**RCV**) LED for each port on the TPMIM.

COLLISION DETECT (CLN)

This red indicator flashes to indicate that a collision has occurred on one of the
segments attached TPMIM. The frequency of flashes may increase as the network
activity increases, since more collisions are likely to occur. The flash of the LED
is pulse-stretched for viewing effect.

ERROR (ERR)

When lit, this red indicator indicates that a potential temperature problem exists
inside the MMAC. If the temperature inside the MMAC remains above the rec-
ommended temperature, failures may occur in network traffic.

LINK OK (LNK)

When lit, this green LED indicates that a link has been established between the TPMIM and the 10BASE-T device at the other end of the twisted pair segment. This LED remains lit as long as the link is maintained.

If no data has been sent for 16 msec, a positive link test pulse of 100 nsec is sent onto the transmit link of the twisted pair cable. The link pulses are received by the TPMIM and checked to determine if the pulse is occurring at the correct rate, polarity and pulse shape. If no pulses are received or the pulses are not correct, the MIM will enter the Link Fail State, and the LED will not be lit. The MIM will not receive or transmit data until the link is restored by receiving a correct link test pulse or a valid packet.

If the LED is flashing, once a good packet passes through the port, this indicates that the polarity of the twisted pair segments' receive link is reversed. Each port on the TPMIM incorporates a Polarity Detection and Correction feature that allows the TPMIM to pass data regardless of the polarity of the twisted pair segments' receive link.

RECEIVE (RCV)

This yellow LED flashes on and off to indicate that the port is receiving a data packet from the segment attached to it. The frequency of flashes may increase as the network activity increases. The flashes are pulse-stretched for viewing effect.